



Environmental Energy Technologies Division Lawrence Berkeley National Laboratory

# BEDES

## Grouping and Prioritization

Technical Working Group Meeting

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- Software User / Developer
  - Energy Simulation Software (User / Developer)
  - NFRC Rating Tools (LBNL / Developer)
    - WINDOW / THERM / Optics / COMFEN / RESFEN
  - Role
    - Liason between programmers and users

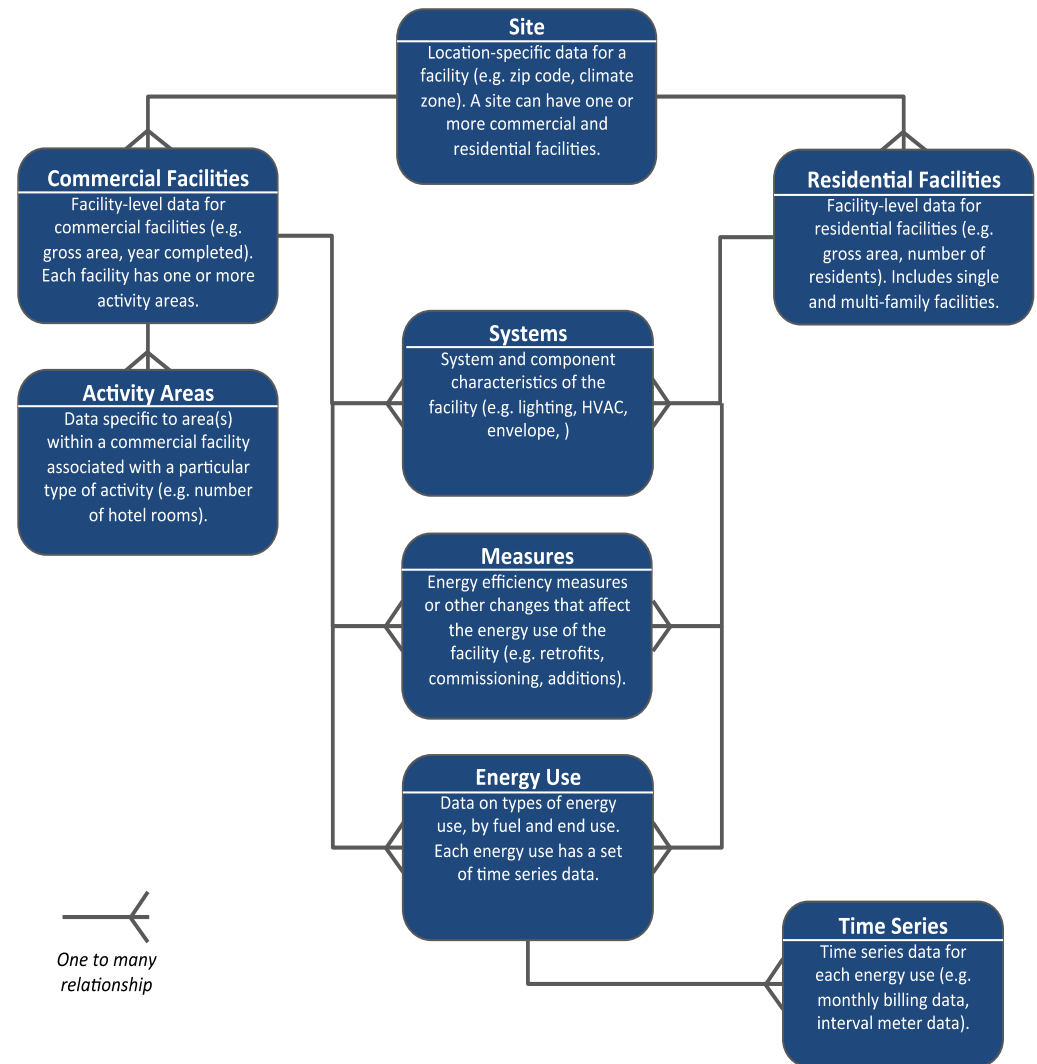
**There is too much complexity in the  
Built Environment**

**One schema or set of data relationships  
will NOT work for all situations**

Different uses for data → different data relationships

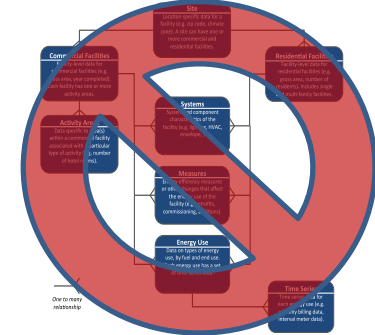
Different data collection goals → different data  
relationships

- Derived from a relational database (BPD)
- Has implied relationships between groups



- From Elena's Kickoff Meeting Overview
  - Data fields
  - Definitions
  - Units of measure

Is **NOT** a database



Does NOT establish relationships between data

Is NEITHER “flat” nor “relational / hierarchical”  
(these are database relationship terms)

Does NOT have a “schema”

- Document organizing principle
  - Informal grouping of like information
  - Not enforced relationships
  - Alphabetical index could also be provided



- LBNL determines fields to include in BEDES from
  - BEDES Beta
  - Stakeholder input
  - Looking at other relevant data specifications
  - Using best engineering judgment
- BEDES will not prioritize fields
- Prioritization → how the data is used
  - Up to the user / aggregator



# Data Relationships Depend on Data and Use

## Site Characterized by:

- Site ID
- Address  
(Street, City, State, Zip, etc)
- Climate Zone

## Facility Characterized by:

- Facility ID
- Type  
(Office, Retail, Hospital, etc)
- Floor Area

There can be the following relationships between Site and Facility

1 Site : 1 Facility

1 Site : Many Facilities (BPD)

Many Sites : 1 Facility (tax assessor data)

Site				
ID	Parent ID	Site ID	Address	City
1	1	2019/9bs4	110 Broadway	Oakland
2	1	2019/8dg7	112 Broadway	Oakland
3	1	2017/a92g	114 Broadway	Oakland
4	2	2023/2ke1	324 Market Street	Oakland
5	3	2019/443f	421 Telegraph Ave	Berkeley

Gray columns are added by the entity who sets up the data set relationships; *they are not specified by BEDES*

Purple columns are the fields that are defined in BEDES.

∞ : 1

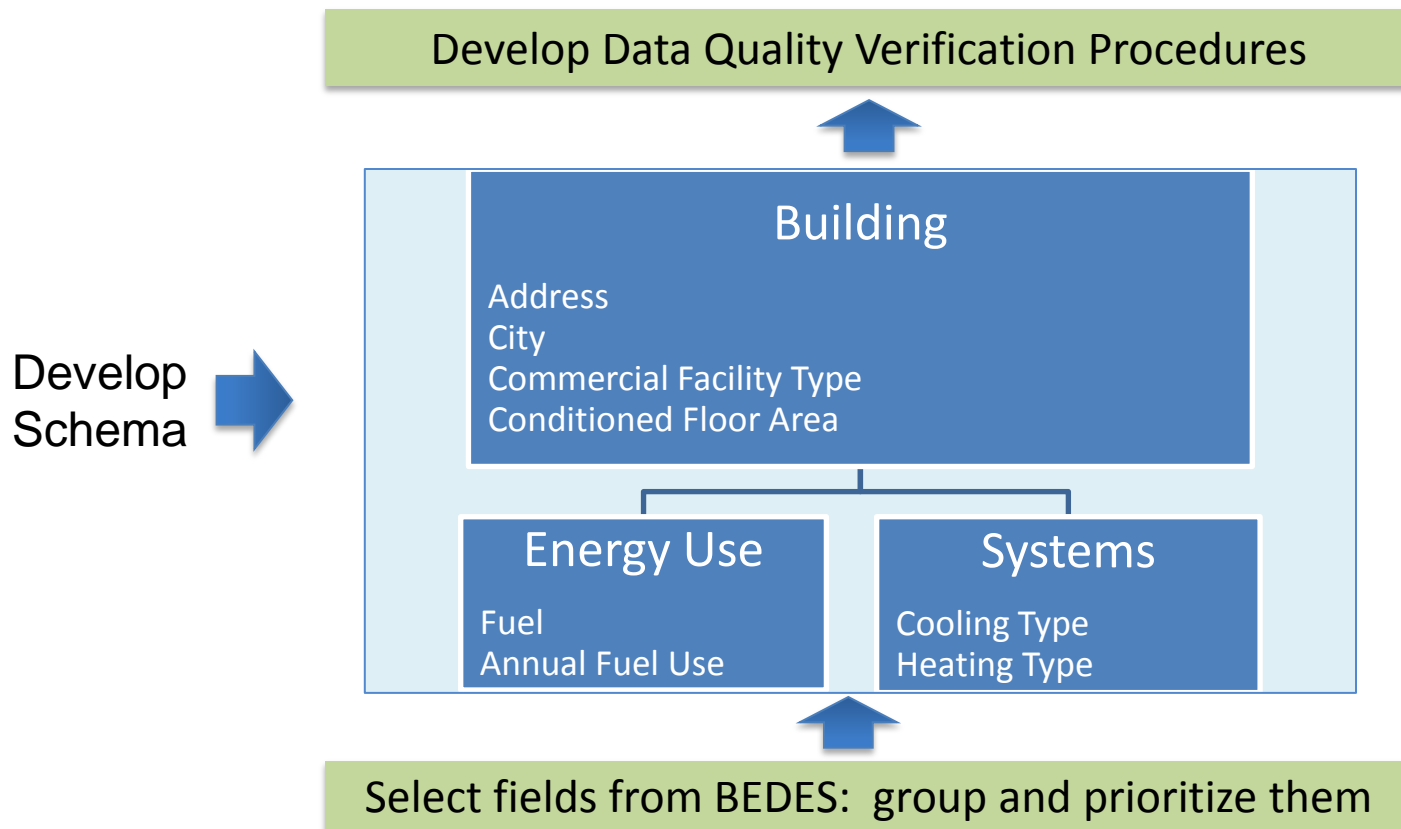
Facility				
ID	Facility ID	Name	Type	Floor Area
1	392001	Broadway Complex	Office	30,000
2	039281	Andy's Market	Retail	10,000
3	920039	Trendy Office Space	Office	40,000

Gray columns are added by the entity who sets up the data set relationships; *they are not specified by BEDES*

Blue columns are the fields that are defined in BEDES.

- Data users / aggregators (not BEDES)
  - **Define** the data relationships they need
    - What data are they interested in
    - How they will use the data
  - **Document** their data relationships
    - Schema or other representation
    - Allows users of data to understand how to interface with it.
    - Make schema publicly available for those who want to use the data

# BEDES Compliant Specification Example



## BEDES

Site	Facility	Measures	Systems	Energy Use
<b>Address</b> <b>City</b> State Zip Complex Type ...	<b>Commercial Facility Type</b> Year Completed Orientation <b>Conditioned Floor Area</b> Rentable Floor Area ...	Type Name Description First Cost Annual Savings Estimate ...	<b>Heating Type</b> Burner Type <b>Cooling Type</b> Refrigerant Capacity ...	<b>Fuel</b> <b>Annual Fuel Use</b> Fuel Use Intensity Summer Peak Winter Peak ...

- Determine fields / field definitions / data types
  - BEDES Beta
  - Stakeholder input
  - Existing DOE documents
  - Existing specifications
  - Best engineering judgment
- Bring Module 1, including field definition, to TWG for review in the next few months

# Mockup of Module 1

Field	Data Type	Definition	Unit of Measure	Source	Mapping
Gross Floor Area	Number (Single)		Square feet (IP)	BEDES Beta	IEP / HPXML: GrossFloorArea RETS: BuildingAreaTotal ESPM: Property Floor Area (Buildings)
		Gross floor area is the sum of the floor areas of the spaces within the building, including basements, mezzanine and intermediate-floored tiers, and penthouses with the headroom height of 7.5 ft. (2.2 meters) or greater. Measurements must be taken from the exterior faces of exterior walls OR from the centerline of walls separating buildings, OR from the centerline of walls separating spaces. Excludes non-enclosed (or non-enclosable) roofed-over areas such as exterior covered walkways, porches, terraces or steps, roof overhangs, and similar features. Excludes air shafts, pipe trenches, and chimneys. Excludes floor area dedicated to the parking and circulation of motor vehicles (ASHRAE)		HPXML	
Net Floor Area	Number (Single)		Square feet (IP)	BEDES Beta	HPXML: NetFloorArea
		Net occupiable floor area: the floor area of an occupiable space defined by the inside surfaces of its walls but excluding shafts, column enclosures, and other permanently enclosed, inaccessible, and unoccupiable areas. Obstructions in the space such as furnishings, display or storage racks, and other obstructions, whether temporary or permanent, may not be deducted from the space are considered to be part of the net occupiable area (ANSI/ASHRAE Standard 62.1-2007)		HPXML	
Rentable Floor Area	Number (Single)		Square feet (IP)	BEDES Beta	
		Definition			
Conditioned Floor Area	Number (Single)		Square feet (IP)	HPXML	
		All finished space that is within the (insulated) conditioned space boundary (i.e., within the insulated envelope), regardless of HVAC configuration (RESNET Formal Interpretation 2010-02 <a href="http://www.resnet.us/standards/Floor_Area_Interpretation.pdf">http://www.resnet.us/standards/Floor_Area_Interpretation.pdf</a> ).		HPXML	
Occupied Floor Area	Number (Single)		Square feet (IP)	BEDES Beta	HPXML: FinishedFloorArea
		Definition			
Lighted Floor Area	Number (Single)		Square feet (IP)	BEDES Beta	
		Definition			
Heated Floor Area	Number (Single)		Square feet (IP)	BEDES Beta	IEP: ConditionedAreaFraction (derived) HPXML: HeatedFloorArea
		Definition			
Cooled Floor Area	Number (Single)		Square feet (IP)	BEDES Beta	IEP: ConditionedAreaFraction (derived) HPXML: CooledFloorArea
		Definition			
Unconditioned Floor Area	Number (Single)		Square feet (IP)	BEDES Beta	

# Mockup of Module 1 – Constrained List Type



Field	Data Type	Definition	Unit of Measure	Source	Mapping
Residential Facility Type	Constrained List	Type of Residential Facility, from the following list:	n/a	BEDES Beta	
		<b>Single Family - Uncategorized</b>			
		A single-family attached or detached home, if not specified. It is defined in opposition to a multi-family dwelling.			
		<b>Single Family - Attached</b>		BEDES Beta	
		A single-family home attached to some other home or structure.			
		<b>Single Family - Detached</b>		BEDES Beta	RETS: Single Family Residence IEP: Single-Family ESPM: Single Family Home
		A single-family detached home, also called a single-detached dwelling or separate house is a free-standing residential building.			
		<b>Manufactured Home</b>		BEDES Beta	RETS: Manufactured Home
		A facility used as a main living accomodation that was assembled off-site and rests on a foundation, not on wheels. Also known as a trailer home.			
		<b>Mobile Home</b>		RETS	
		A vehicle parked in one particular place and used as a permanent living accommodation.			
		<b>2-4 Unit Building</b>		BEDES Beta	RETS: Duplex Triplex Quadraplex
		A unit in a building with two to four housing units--a structure that is divided into living quarters for two, three, or four families or households in which one household lives above or beside another. This category also includes houses originally intended for occupancy by one family (or for some other use) that have since been converted to separate dwellings for two to four families. Typical arrangements in these types of living quarters are separate apartments downstairs and upstairs or one apartment on each of three or four floors.		US DOE EIA. <a href="http://www.eia.gov/emeu/recs/glossary.html">www.eia.gov/emeu/recs/glossary.html</a>	
		<b>5+ Unit Building</b>		BEDES Beta	
		A unit in a building with five or more housing units--a structure that contains living quarters for five or more households or families and in which one household lives above or beside another.		US DOE EIA. <a href="http://www.eia.gov/emeu/recs/glossary.html">www.eia.gov/emeu/recs/glossary.html</a>	
		<b>Multifamily - Uncategorized</b>		BEDES Beta	
		Definition			
		<b>Multifamily - Town Homes</b>		BEDES Beta	RETS: Townhouse
		Definition			
		<b>Multifamily - Condominiums</b>		BEDES Beta	RETS: Condominium
		Definition			
		<b>Apartment Unit</b>		BEDES Beta	RETS: Apartment
		Definition			
		<b>Studio Unit</b>		HPXML	
		Definition			
		<b>Other</b>		BEDES Beta	
		Definition			
		<b>Unknown</b>		BEDES Beta	
		Definition			

- BEDES defines Conditioned Floor Area
- BEDES Compliant data sets
  - Conditioned Floor Area data is consistent
  - Relationships between the data may be different
- How does a data user or aggregator learn the data relationships ?
- They must talk, individually, to the data provider



- **Collaborative public space** for BEDES & Schemas
  - BEDES is published there
  - Data aggregators/implementers responsible for
    - Publishing data specifications / structure / schema
    - Mapping and maintenance of mapping to BEDES
    - Data verification path for each schema
  - BEDES can be expanded over time with input from collaborators
  - **An ideal scenario (over time)**
    - **One primary schema emerges for each major building sector or data collection need**